GREEN SEAL'S Case GREEN REPORT

SEPTEMBER–OCTOBER 1999

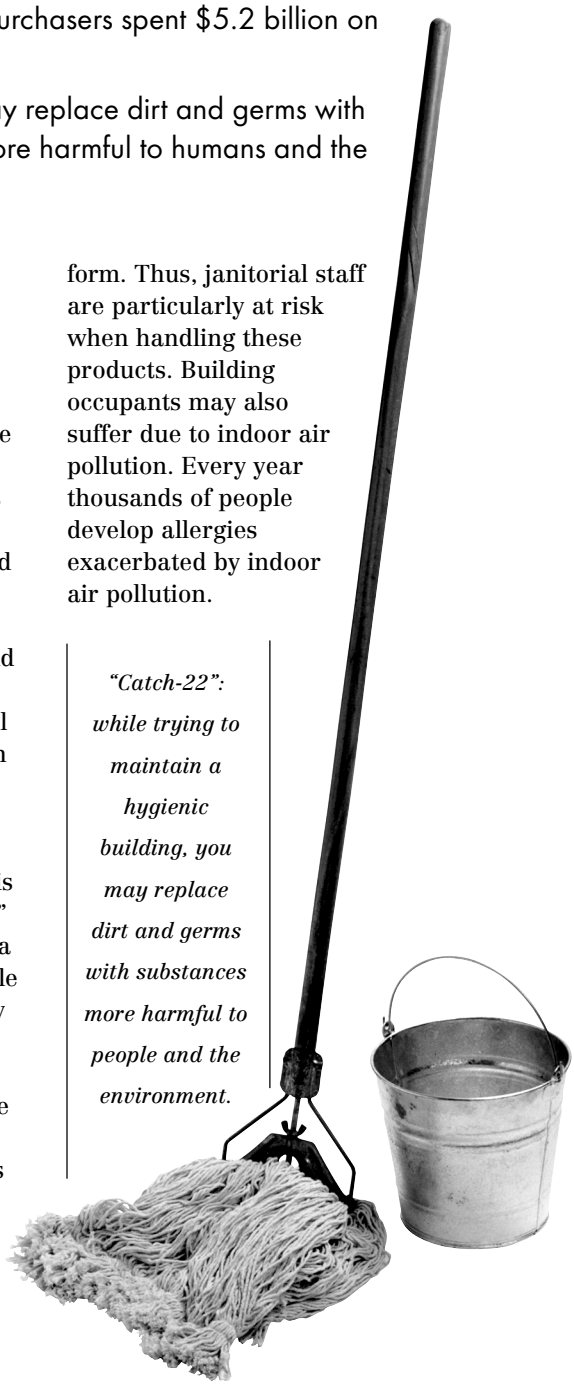
INDUSTRIAL AND INSTITUTIONAL CLEANERS

- The average person spends about 90 percent of their day indoors, where air pollution–from diverse sources such as cleaners, upholstery and carpeting–can be up to 100 times greater than the outdoor air.
- Industrial and institutional purchasers spent $5.2 billion on cleaners in 1998.
- Some cleaning products may replace dirt and germs with substances that are even more harmful to humans and the environment.

The ubiquitous nature of cleaning products—combined with the duration that people are exposed to them and their potential harm to the natural environment—make the move toward more environmentally sound cleaning products crucial.

Maintaining clean buildings and facilities is essential to ensuring that employees are healthy and productive and visitors are safe and comfortable. Choosing industrial and institutional cleaners that will make your building squeaky clean as well as environmentally sound can be challenging, as many products on the market contain toxic or hazardous chemicals. This situation can present a "catch-22" because while trying to maintain a hygienic environment for the people in your building, you may actually be replacing dirt and germs with substances even more harmful to people and the environment. These cleaners are generally more powerful than household cleaners and sold in a more concentrated form. Thus, janitorial staff are particularly at risk when handling these products. Building occupants may also suffer due to indoor air pollution. Every year thousands of people develop allergies exacerbated by indoor air pollution.

"Catch-22": while trying to maintain a hygienic building, you may replace dirt and germs with substances more harmful to people and the environment.



Industrial and institutional cleaners may contain many toxic chemicals. Often, more than one type of cleaner is used within a single building, facility or room. The combined effect of multiple toxic or hazardous chemicals, even in minute amounts, can magnify the negative effects of the individual ingredients. Depending upon the duration, route and extent of exposure, certain ingredients in industrial and institutional (I & I) cleaners may cause mild to serious health impacts. Short term health problems caused by exposure range from eye irritation and coughing to chest pain, vomiting, cramps and diarrhea. Long term effects may include liver and kidney failure, birth defects, emphysema, brain damage and even cancer.

Our lakes, rivers, and oceans are being polluted by many of the chemicals found in cleaning products used by establishments as diverse as hospitals and hotels, and institutions from governments to universities. Rinsing and disposal of spent solutions, containers and cleaning cloths can cause negative environmental and ecological impacts. For instance, chlorine and phosphates added to some cleaners as bleaching and building agents, respectively, can cause serious harm to aquatic ecosystems and the plants, invertebrates and fish within.

There are over 70,000 chemicals being used today. Fewer than 2% have been thoroughly tested for their effects on human and aquatic life.

In response to increasing consumer health and safety concerns and governmental regulation of chemical constituents, many manufacturers of I & I cleaners have introduced environmentally preferable alternatives. Carefully evaluating your cleaning needs and identifying the products that will accomplish the task without causing harm is possible, once you know how. By following a few guidelines and thinking green, you can make a significant difference in both the health of your employees and the future of the planet.

The ***Choose Green Report*** is published for Green Seal Environmental Partners. To become an Environmental Partner, or to receive a copy of this report, contact Green Seal at 202-872-6400 x 21 or greenseal@ greenseal.org.

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How To Be Clean and Green

Green Seal contacted over 60 manufacturers of I & I cleaners to gather product information. We evaluated these products using the environmental criteria discussed below, and developed a list of recommended cleaners which meet the criteria. Although the I & I cleaner category covers products for a range of uses, we limited the evaluation and review to the categories most applicable to a wide audience: general purpose, multi-purpose, floor and bathroom cleaners. Please note that many of the manufacturers offer products that can meet more specific needs.

■ **Is it non-toxic to both humans and aquatic life?**

Various components of I & I cleaners, such as surfactants, bleaches, builders and enzymes, are necessary to impart desirable performance attributes to the final products. However, the nature of the chemical additives used in many cleaners makes toxicity a major issue in this product category. Not all of the chemicals used are toxic, but those that are may damage organs, tissues and cells, and inhibit proper systemic functions of aquatic plants and animals as well as humans. Cationic surfactants used in germicidal cleaners are generally the most toxic, as their main purpose is to kill (see section on disinfectants).

Pathways of exposure for people vary, from oral intake and inhalation to dermal absorption. Some short term effects of exposure to toxic chemicals can include skin irritation and respiratory problems, while long term exposure may result in permanent damage such as bone marrow loss or lung cancer. Avoid cleaners that are toxic to prevent harm to workers, building occupants and the aquatic environments where cleaning waste or wastewater may end up.

■ **Is it biodegradable?**

Biodegradability is measured by the amount of time it takes for large organic molecules to break down into smaller molecules in the environment. A chemical that is readily biodegradable begins to break down immediately and eventually degrades into water, mineral salts, carbon dioxide and

GET THE DIRT ON YOUR CLEANERS

We have provided a list of cleaners that meet the criteria discussed in this report. To find out what is inside your cleaning products, follow these steps until you get the answers you need. If your cleaners do not meet the preferred attributes, consider substituting them with some of the products recommended in this report.

1 Read the label

Labels do not always tell the whole story, as there is limited space on the label, and manufacturers are not required to list product ingredients. However, labels are a good place to start because they will have basic information about safe use and will provide information on immediate health risks. The Consumer Product Safety Commission requires that appropriate signal words be placed on the labels, as these will indicate the nature of the potential harm. The required words and definitions are:

a) caution or warning—hazardous substance
b) danger—extremely flammable, corrosive or highly toxic substance
c) poison—highly toxic

2 Review the Material Safety Data Sheets (MSDS)

All manufacturers are required to provide an MSDS for their products that include hazardous constituents. The MSDS contains information about the product including ingredients, health hazards, proper safety gear and handling, and physical hazards such as flammability, corrosivity and reactivity. The MSDS must also list chemicals that are probable or proven carcinogens, and those that fall under certain regulations such as the Superfund Amendments and Reauthorization Act (SARA 313). Hazardous chemicals that make up 1 percent or more of the product, and carcinogens that make up at least 0.1 percent are required to be listed on the MSDS.

3 Call the Manufacturer

If you have questions that cannot be answered by the written information available to you, contact the manufacturer with specific questions. Not only will you get the answers you need, but you will be letting the manufacturer know that you are interested in the environmental and health effects of its products.

other oxides. Products that are not biodegradable may accumulate in the ecosystem and pose a potential danger of entering plant and animal tissue. Many products are touted as biodegradable, and probably are over time, but it is the speed with which this occurs that is important. Many factors contribute to how readily biodegradable a product will be. For example, fatty acids derived from petroleum degrade more slowly than vegetable sources. Look for cleaners that are readily biodegradable.

■ **Does it have a low corrosivity factor?**

The pH level of your cleaning product is important to know in order to properly handle and dispose of the product. The pH can be anywhere from 0 (most acidic) to 14 (most alkaline), where 7 is neutral, the pH of water. A particularly acidic or alkaline compound may cause skin irritations, stains or major burns, and can erode certain surfaces due to its corrosivity. The pH alone is not the single factor which will determine potential hazard, because compounds with similar pH levels can have fairly different corrosivity factors. Check the hazards identification section of the material safety data sheet (MSDS) for likely exposure effects. Look for products with a pH that is closest to 7 and select the mildest product compatible with the area being cleaned. Always ensure that handlers use the appropriate cleaning tools and protective gear to avoid potential harm.

■ **Does it have acceptable VOC levels?**

One of the biggest health hazards today is indoor air pollution. In some cases, air inside a building can be as much as 100 times more polluted than outside. If you have ever walked into a building and started coughing from the distinct odor of cleaners, it is likely the volatile organic compounds (VOCs) that are triggering your reaction. VOCs are a class of substances that evaporate easily and react in the atmosphere with sunlight and heat, creating smog and otherwise unhealthy breathing environments.

Millions of tons of VOCs are released into the air. The USEPA

has found that over 900 different VOCs can be found in indoor air alone, from sources such as I & I cleaners as well as "offgassing" from furniture, carpeting and paints. Exposure to high levels of VOCs can cause eye irritation, nausea, vomiting, headaches and impaired memory. VOCs present in some I & I cleaners include formaldehyde and benzene, known or suspected carcinogens, and toluene, a factor in central nervous system dysfunction. D-Limonene and D-Pinene are sometimes used in cleaners and other products as a replacement for petroleum based compounds. These are both derived from natural sources, yet they are also VOCs. Although it may be preferable to use renewable, plant-based substances as opposed to petroleum resources, it does not necessarily make them less of a health risk. Whatever the source of VOCs, look for products that have no more than 10 percent VOC content when diluted for use.

■ **Is it sold in concentrated form?**

Industrial and institutional cleaners purchased as concentrated solutions are beneficial in a couple of ways. Concentration is measured by the amount of water—by weight — compared to other ingredients contained in the cleaning solution. Concentration offers a greater percentage of active ingredients in the product, which may amount to less packaging needed per use. This results in savings for the manufacturer via reduced packaging and related costs, as well as less energy used per package for shipping. The customer may reap cost savings through lower prices charged by the manufacturer or because they are paying for desired product instead of water. The smaller packaging will also conserve storage space as well as minimize solid waste (see packaging section). The intended use will determine the ideal ratio of water to product. It is extremely important to train janitorial staff on the proper handling of concentrated cleaners, as they can be more hazardous in this form.

■ **Can it work for multiple cleaning purposes?**

Multi-purpose cleaners can be used for a variety of cleaning jobs, usually with just a change of dilution or the type of tool used to do the job. The benefit of multi-purpose cleaners is that one product can replace several different solutions, potentially simplifying the purchasing process as well as employee safety and handling training.

Multi-purpose cleaners may contain a variety of specialty chemicals for removing dirt, brightening, eliminating odors, and disinfecting *(see note). At the same time, this can mean that there are superfluous ingredients in the product. For instance, fragrances and dyes do not improve the cleaning power of the product but may increase the amount of harmful chemicals in the product. Also, if improper dilution rates are used, this may result in too strong a solution being used for certain jobs. Often, milder products can work just as well as more stringent ones if used with a little more "elbow grease" instead of harsh chemicals. Cleaning staff must be

PACKAGING

When evaluating the packaging of a cleaner, there are several attributes that make one product preferable to another. Choose recyclable or reusable containers and buy in bulk because—in this case—it isn't just what's inside that counts!

❑ **Check with your supplier to see if the product comes in a reusable container.** This will not only reduce the waste stream, but also save energy and raw materials that would otherwise be used to produce new containers.

❑ **Make sure the package is recyclable**—more specifically, ensure that it is readily recyclable in your area. The most common containers for I & I cleaners are made of high density polyethylene (HDPE), a plastic commonly recycled, and polyvinyl chloride (PVC), a material that most often is not recycled. Moreover, due to concern over potential toxic releases from additives in goods made with PVC, some companies are phasing out this material in products from toys to athletic shoes. Look for the Society of Plastics Industry symbol—a number surrounded by triangular chasing arrows—to determine what resin the container is made from. The number 2 signifies HDPE content and 3 denotes the use of vinyl and its derivatives.

❑ **Check that the packaging has been made out of recycled materials.** Many manufactures already use plastic containers that are made from some amount of post-consumer recycled materials.

❑ **Look for products that are sold in bulk,** which often saves on the total amount of packaging needed as well as energy needed to transport the product, since your order will require fewer shipments.

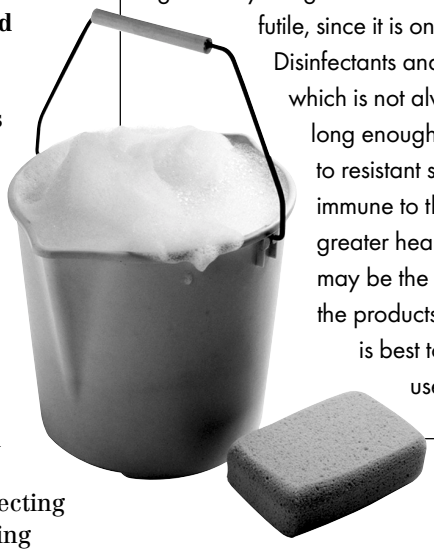
trained as to the proper uses, dilution ratios, cleaning tools and protective clothing required for each cleaning job.

■ **Is it effective when diluted with water at room temperature?**

Concentrated I & I cleaners should work optimally when diluted with room temperature water. This saves the energy that would otherwise be needed to heat the water for product dilution. It is important to educate handlers on the appropriate amount and temperature of water needed for a particular cleaning job. Otherwise, the benefits of selecting environmentally sound cleaning products will be negated by excess product use and energy waste.

THE DISINFECTANT DEBATE

There is some debate surrounding the necessity of and the benefit to be gained by using disinfectants. Killing bacteria in a public restroom may be futile, since it is only effective until the next person enters the room. Disinfectants and germicides are only effective if used properly, which is not always the case. If the product is not left on a surface long enough, only certain bacteria will die, and this can lead to resistant strains. Similarly, bacteria or virus can become immune to the chemicals over time creating a potentially greater health concern. If large areas must be disinfected, as may be the case in hospitals, great care must be taken to use the products properly. If small areas need to be disinfected, it is best to spot clean the area that must be germ-free, and use a general purpose cleaner elsewhere.



Just Say No To These Additives

■ **EDTA or NTA**

Ethylene diamine tetraacetic acid (EDTA) and nitrilotriacetic acid (NTA) are chelates (substances that bond with metal particles to prevent decomposition of aqueous cleaning products). EDTA is undesirable because of its slow biodegradability and its potential to mobilize heavy metals from wastewater treatment sludges or sediments in surface waters. NTA may be more readily biodegradable than EDTA, but is a possible carcinogen. Moreover, NTA production requires the use of reactants such as formaldehyde, a carcinogen, and hydrogen cyanide, a highly toxic substance.

■ **Petroleum or petrochemical compounds**

Petroleum is a non-renewable resource, so using products derived from a renewable source is generally preferable to depleting one which is limited, provided that any performance or cost differentials that might exist are acceptable. In addition, the extraction and refining of petroleum can cause more environmental harm than available alternatives. Some petroleum-based solvents such as petroleum distillates are central nervous system depressants, and can also affect the liver and kidneys. Avoid cleaners with petroleum or its compounds.

■ **Chlorine bleach**

Chlorine bleach is often used in cleaners to disinfect and brighten surfaces, but at a potentially high cost. Janitorial workers are at risk for eye and skin damage from splashes that may occur when mixing or using the cleaner. Also, when sodium hypochlorite—the active ingredient in chlorine bleach—is released into the environment, it may react with other elements and create toxic compounds. It is not biodegradable and can kill microorganisms in waste-water treatment plants and water bodies. Sodium percarbonate is one effective substitute without these potential dangers.

■ **Phenolic compounds and glycol ethers**

Phenolic compounds, sometimes used in cleaners as a germicide, are extremely hazardous substances. Not only are they toxic, volatile and corrosive, but they can be harmful to humans via inhalation and dermal absorption and are a suspected carcinogen.

Glycol ethers, such as ethylene glycol and butoxy ethanol, are used in cleaners and degreasers for dissolving oil, wax, and resin. Some are more toxic than others and can cause symptoms ranging from headaches, blurred vision and respiratory irritation to bone marrow and reproductive health damage. Janitorial staff may need to use these products in poorly ventilated areas and are more susceptible to the harmful effects. Many cleaners on the market today are free of glycol ethers; make sure that yours is one of them.

■ **Alkyl Phenol Ethoxylates (APE)**

These compounds, including the surfactant nonylphenol ethoxylate commonly used in detergents, are neither readily nor completely biodegradable. More importantly, when they break down, the chemicals formed are more harmful and persistent than the

Continued on back page

Recommended Industrial and Institutional Cleaners

Based upon information provided by the manufacturers, each recommended industrial and institutional cleaners in this section meets the following criteria:

- Is not toxic to human or aquatic life
- Contains VOC levels under 10 percent by weight when diluted for use
- Is readily biodegradable
- Works optimally in room temperature water
- Has acceptable pH level (between 2.5 - 12)
- Is not made of petroleum or petrochemical compounds
- Does not contain chlorine bleach
- Is free of phosphates and derivatives
- Does not contain EDTA or NTA
- Does not contain phenolic compounds or glycol ethers
- Is free of: arsenic, cadmium, chromium, lead, mercury, nickel and selenium

Some of the products listed may also have these additional advantages:

- Refillable containers
- Recycled content packaging
- Concentrated with 20 percent or less water
- Online accounts for easier purchasing and lower paper use

COMPANY	PRODUCT	PH	% VOC	% WATER (undiluted product)
Alfa Kleen	Tile, Chrome & Porcelain Cleaner	5	0	80
Alfa Kleen	All Purpose Spray	5	0	90
Alfa Kleen	Santizer and Cleaner	9	0	92
The Clean Environment	N1 All-Purpose	4.9	0	89
The Clean Environment	N7 Basin Tub & Tile	11.1	0	85
The Clean Environment	N20 Neutral Degreaser	7	0	89
CFR Corporation	All Purpose Spotter	2.5–3.5	4.5	86
CFR Corporation	Enz-Soil One	10	0	0
DynaChem (Alphen)	H2Orange2 Floor Cleaner	7.61	.015	0
DynaChem (Alphen)	H2Orange2 Bathroom Cleaner	7	.148	0
EnviroSmart Products	APC Concentrate	9.5	4.8	13
EnviroSmart Products	Deodorizing Bathroom Cleaner Concentrate	3	1-2 *	22
EZ Qui Industries	A-Ben-A-Qui (EZ-Task)	8-9	0	52
Gaylord Industries	Formula G-510	9.7	Not Detectible	60
Ipax Cleanogel	Green Unikleen Degreaser and Floor Cleaner	9.5	0	0
Ipax Cleanogel	Unisource Floor Cleaner and Deodorizer	7.3	0	0
KC Products	KC's Citrus	7	5.5 *	26
KC Products	ECO 2000 Multiuse Degreaser/Cleaner	10.0	0	83
National Cemical Laboratories,Inc.	CITROL Industrial Degreaser and Deodorizer	6.5–8	2	0

* VOC content of product when diluted for general purpose cleaning

Recommended Industrial and Institutional Cleaners (cont.)

COMPANY	PRODUCT	PH	% VOC	% WATER (undiluted product)
Native Solutions	Neutral Cleaner	7–8.5	<2	<10
Naturally Yours	All Purpose	6–8	0.2	45
Naturally Yours	Enz–Away	8	0.3	47
PCI of America: Hurrisafe	9010 All Purpose Cleaner	10.0	0	96
P&D Creative	Magic 555 Industrial Degreaser and Cleaner	10.3–11.5	0	0
P&D Creative	Magic 555 Spot and Stain Remover	9.4–10.2	0	0
Puritan Services	Dazzle Clean	9	0	84
Rochester Midland	Enviro Care All Purpose Cleaner	7	0	0
Rochester Midland	Enviro Care Washroom Fixture Cleaner	4	0	0
Rochester Midland	Enviro Care Tough Job Cleaner	9	0.2–0.6	0
Rochester Midland	Enviro Care Neutral Disinfectant	7	<.01	0
SafeScience	General Purpose Cleaner	9.3–9.7	0	70
SafeScience	Bathroom Cleaner	7.8–8.2	0	70
SafeScience	Floor Cleaner	8.0–8.4	0	78
Shadow Lake	Citra-Solv	7	2 *	0
SOQ Environmental Technology	Ecomate-MPC	10.2	0	0
SOQ Environmental Technology	Ecomate-FN	10.5–11.9	0	0
Spartan Chemical	Damp Mop	7.5	0	80–90
Ultra Shield	Cleaner Concentrate	9.8	1.4	65

* VOC content of product when diluted for general purpose cleaning

MANUFACTURER CONTACT INFORMATION

Alfa Kleen 714-524-2530
CFR Corporation . . . . . 800-533-2557 x 232
The Clean Environment 402-464-0988
Dyna Chem 800-281-9604
EnviroSmart Products 888-655-3772
EZ Qui Industries 603-668-2829
Gaylord Industries 800-547-9696
Ipax Cleanogel 313-933-4211
KC Products 800-927-9442
National Chemical Labs . . . . 800-NAT-CHEM x 266, 271
Native Solutions 360-491-0992
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P & D Creative 301-797-3503
Puritan Services 800-275-1999
Rochester Midland 800-762-4448
Safe Science 617-422-0674 x102
Shadowlake 800-343-6588
SOQ Environmental Technologies 800-345-2892
Spartan Chemical 800-537-8990
Ultra Shield 909-673-0091

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precursors. Some studies have also found that APEs are endocrine disruptors, which can affect hormonal activity of humans and animals.

■ **Phosphates or derivatives**

Cleaners may also contain phosphates, which serve as detergent builders and chelates. Although phosphate is a nutrient for aquatic plants, it can cause an overgrowth of algae when too much is present in the ecosystem. These algae "blooms" block the sunlight that aquatic plants need for photosynthetic activity, and deplete the water of oxygen needed by aquatic life. Despite bans on phosphates in some detergents, they may still be found in I & I cleaners. Alternatives to phosphates, such as sodium bicarbonate and sodium citrate, will impart the useful properties with less environmental risk. So look for cleaning products that are no more than 0.5 percent phosphates by weight or, better yet, are phosphate-free.

■ **Heavy metals**

Although not present in significant quantities in most I & I cleaners, heavy metals may appear due to the presence in dyes or from impurities in other ingredients. Heavy metals can contaminate aquatic plants and animals and eventually those further up the food chain.

CLEAN, SAFE AND GREEN

❑ **Purchase products that are as benign as possible**
– avoids unnecessary overexposure to potentially harmful substances
– reduces the amount of training and mandated personal protective equipment needed
– eliminates the expense of disposing of excess product or packaging

❑ **Purchase concentrated and/or multipurpose products in reusable containers**
– saves storage space and reduces solid waste costs
– eliminates handling and safety instructions for multiple products
– simplifies purchasing

❑ **Train employees on appropriate products, usage, handling and tools**
– prevents excess product from polluting the environment
– reduces potential harm to employees using the products
– lowers costs associated with excess product